SEQUENCE LISTING

<110>  EXELIXIS, INC.

<120>  INSECT P53 TUMOR SUPPRESSOR GENES AND PROTEINS

<130>  EX00015C FIRST AMENDMENT

<140>  US 09/524,101
<141>  2000-03-13

<150>  US 09/268,969
<151>  1999-03-16

<150>  US 60/184,373
<151>  2000-02-23

<160>  35

<170>  PatentIn version 3.2

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<213>  Drosophila melanogaster

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gatatcaagg aggatattcc gaaaacggtg gaggtatcgg gatcggaatt gaccacggaa     240

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cccctgaaca tgagccggtc tgtaacccgc agtgggctca cgcgccagac cctggccttc     780

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gagaaagcat gcggcgatat cgtgggacag catgttatac atgttaaaat atgtacgtgc     900

1

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gaggacacgg agagcaatga tagccgagac tgcgacgact ccgccgcaga gtggaacgtg     1080

tcgcggacac cggatggcga ttaccgtctg gctattacgt gccccaataa ggaatggctg     1140

ctgcagagca tcgagggcat gattaaggag cggcggctg aagtcctgcg caatcccaac      1200

caagagaatc tacgtcgcca tgccaacaaa ttgctgagcc ttaagaaacg tgcctacgag     1260

ctgccatgac ttctgatctg gtcgacaatc tcccaggtat cagatacctt tgaaatgtgt     1320

tgcatctgtg gggtatacta catagctatt agtatcttaa gtttgtatta gtccttgttc     1380

gtaaggcgtt taacggtgat attcccctttt tggcatgttc gatggccgaa aagaaaacat    1440

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<212> PRT
<213> Drosophila melanogaster

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            20                  25                  30


Val Glu Val Ser Gly Ser Glu Leu Thr Thr Glu Pro Met Ala Phe Leu
        35                  40                  45


Gln Gly Leu Asn Ser Gly Asn Leu Met Gln Phe Ser Gln Gln Ser Val
    50                  55                  60


Leu Arg Glu Met Met Leu Gln Asp Ile Gln Ile Gln Ala Asn Thr Leu
65                  70                  75                  80


Pro Lys Leu Glu Asn His Asn Ile Gly Gly Tyr Cys Phe Ser Met Val
                85                  90                  95


Leu Asp Glu Pro Pro Lys Ser Leu Trp Met Tyr Ser Ile Pro Leu Asn
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2

Lys Leu Tyr Ile Arg Met Asn Lys Ala Phe Asn Val Asp Val Gln Phe
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Lys Ser Lys Met Pro Ile Gln Pro Leu Asn Leu Arg Val Phe Leu Cys
        130                135                140

Phe Ser Asn Asp Val Ser Ala Pro Val Val Arg Cys Gln Asn His Leu
145                150                155                160

Ser Val Glu Pro Leu Thr Ala Asn Asn Ala Lys Met Arg Glu Ser Leu
                165                170                175

Leu Arg Ser Glu Asn Pro Asn Ser Val Tyr Cys Gly Asn Ala Gln Gly
            180                185                190

Lys Gly Ile Ser Glu Arg Phe Ser Val Val Val Pro Leu Asn Met Ser
        195                200                205

Arg Ser Val Thr Arg Ser Gly Leu Thr Arg Gln Thr Leu Ala Phe Lys
    210                215                220

Phe Val Cys Gln Asn Ser Cys Ile Gly Arg Lys Glu Thr Ser Leu Val
225                230                235                240

Phe Cys Leu Glu Lys Ala Cys Gly Asp Ile Val Gly Gln His Val Ile
            245                250                255

His Val Lys Ile Cys Thr Cys Pro Lys Arg Asp Arg Ile Gln Asp Glu
            260                265                270

Arg Gln Leu Asn Ser Lys Lys Arg Lys Ser Val Pro Glu Ala Ala Glu
        275                280                285

Glu Asp Glu Pro Ser Lys Val Arg Arg Cys Ile Ala Ile Lys Thr Glu
    290                295                300

Asp Thr Glu Ser Asn Asp Ser Arg Asp Cys Asp Asp Ser Ala Ala Glu
305                310                315                320

Trp Asn Val Ser Arg Thr Pro Asp Gly Asp Tyr Arg Leu Ala Ile Thr
            325                330                335

3

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Cys Pro Asn Lys Glu Trp Leu Leu Gln Ser Ile Glu Gly Met Ile Lys
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Glu Ala Ala Ala Glu Val Leu Arg Asn Pro Asn Gln Glu Asn Leu Arg
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Arg His Ala Asn Lys Leu Leu Ser Leu Lys Lys Arg Ala Tyr Glu Leu
    370                 375                 380


Pro
385


<210>  3
<211>  2600
<212>  DNA
<213>  Leptinotarsa decemlineata

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atgtcttctc agtcagactt tttacctcca gatgttcaaa atttcctctt ggcagaaatg     180

gaaggggaca atatggataa tctaaacttt ttcaaggacg aaccaacttt gaatgattta     240

aattattcaa acatcctaaa tggatcaata gttgctaatg atgattcaaa gatggttcat     300

cttattttc cgggagtaca aacaagtgtc ccatcaaatg atgaatacga tggtccatat     360

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ctgaataaag tttatatgac aatgggcagt ccatttcctg tagatttcag agtatcacat     480

cgacccccga acccattatt catcaggagc actcccgttt acagtgctcc ccaatttgct     540

caagaatgtg tttaccggtg cctaaaccat gaattctctc ataaagagtc tgatggagat     600

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ggtactgaaa gtgttagaga aatttcgaa tttgtttgca aaaattcttg cccaagtcct     780

ggaatgaata aagagctgt ggaaataata ttcactttgg aggataatca aggaactatc     840

tatggacgca aaacattaaa tgtgagaata tgctcttgtc caaaacgtga taaagagaaa     900

gatgaaaagg ataacactgc caacactaat ctgccgcatg caaaaagag aaaaatggag     960

aagccatcaa agaaacccat gcagacacag gcagaaaatg ataccaaaga gtttactctg    1020
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4

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ttaaacaaaa taaacacgtt gatacgtgaa agttccgagt gaccttatca attctatgta    1200

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cttttcttgc tttattttat acacttgagt caagtgtagt cagtacattg actatgctgg    1800

aaaacctgtt ttgagtttat ttttacttac attcagttct catcattaga aattgtttat    1860

tttttgtgtg caatatttac gaaaaatggt gcaatactat aataggaaca ttaataaagt    1920

aacttgaaag catagaggtg gtgaattttg tttttgatca acttttttgaa atttatgcgc    1980

cattctataa gccagttttt tttgataaat tcaaaattca cgaataggta tcaacctgat    2040

tgcatgctta ttctatgttt gtcctaaagc aggtctctat aaaacttctc taaaagttgt    2100

gcagagcaaa taacaaataa ttttttaatg gattatatca attcatgaac tggtttaatt    2160

gaaagagtag attattctat tgggttcaca aaaatataaa taatgtgtta ctatctggat    2220

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cccagtgcca tagtcgacga tcggtctcgc tcccatccat caattattcg aaatctcatt    2340

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5
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<211> 354
<212> PRT
<213> Leptinotarsa decemlineata

<400> 4

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            20                  25                  30


Asp Glu Pro Thr Leu Asn Asp Leu Asn Tyr Ser Asn Ile Leu Asn Gly
        35                  40                  45


Ser Ile Val Ala Asn Asp Asp Ser Lys Met Val His Leu Ile Phe Pro
    50                  55                  60


Gly Val Gln Thr Ser Val Pro Ser Asn Asp Glu Tyr Asp Gly Pro Tyr
65                  70                  75                  80


Glu Phe Glu Val Asp Val His Pro Thr Val Ala Lys Asn Ser Trp Val
            85                  90                  95


Tyr Ser Thr Thr Leu Asn Lys Val Tyr Met Thr Met Gly Ser Pro Phe
            100                 105                 110


Pro Val Asp Phe Arg Val Ser His Arg Pro Pro Asn Pro Leu Phe Ile
            115                 120                 125


Arg Ser Thr Pro Val Tyr Ser Ala Pro Gln Phe Ala Gln Glu Cys Val
        130                 135                 140


Tyr Arg Cys Leu Asn His Glu Phe Ser His Lys Glu Ser Asp Gly Asp
145                 150                 155                 160


Leu Lys Glu His Ile Arg Pro His Ile Ile Arg Cys Ala Asn Gln Tyr
                165                 170                 175


Ala Ala Tyr Leu Gly Asp Lys Ser Lys Asn Glu Arg Leu Ser Val Val
            180                 185                 190


Ile Pro Phe Gly Ile Pro Gln Thr Gly Thr Glu Ser Val Arg Glu Ile
            195                 200                 205
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Phe Glu Phe Val Cys Lys Asn Ser Cys Pro Ser Pro Gly Met Asn Arg
    210                 215                 220

Arg Ala Val Glu Ile Ile Phe Thr Leu Glu Asp Asn Gln Gly Thr Ile
225                 230                 235                 240

Tyr Gly Arg Lys Thr Leu Asn Val Arg Ile Cys Ser Cys Pro Lys Arg
                245                 250                 255

Asp Lys Glu Lys Asp Glu Lys Asp Asn Thr Ala Asn Thr Asn Leu Pro
                260                 265                 270

His Gly Lys Lys Arg Lys Met Glu Lys Pro Ser Lys Lys Pro Met Gln
            275                 280                 285

Thr Gln Ala Glu Asn Asp Thr Lys Glu Phe Thr Leu Thr Ile Pro Leu
    290                 295                 300

Val Gly Arg His Asn Glu Gln Asn Val Leu Lys Tyr Cys His Asp Leu
305                 310                 315                 320

Met Ala Gly Glu Ile Leu Arg Asn Ile Gly Asn Gly Thr Glu Gly Pro
                325                 330                 335

Tyr Lys Ile Ala Leu Asn Lys Ile Asn Thr Leu Ile Arg Glu Ser Ser
            340                 345                 350

Glu Trp


<210>   5
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<212>   DNA
<213>   Tribolium castaneum

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catcattcct gatgttgata aattttggga agatcatgga ctcaaggacg atgtgggaag     180

aataatgcac gaaacaacg tccatttagt aaatgacgac ggagaagaag aaaaatactc      240

taatgaagcc aattacactg aatcaatttt cccccccgac cagcccacaa acctaggcac     300

tgaggaatac ccaggccctt ttaatttctc agtcctgatc agccccaacg agcaaaaatc    360

gccctgggag tattcggaaa aactgaacaa aatattcatc ggcatcaacg tgaaattccc    420

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cgtgttcagc caaacgcagc acttccaaga cctggtgcac cgctgcgtcg gccaccgcca    540

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caccaacgac aacgccctat actttggcga taaaaacaca gggacgagac tcaacatcgt    660

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gtgcaaaaac tcctgccctt tggggatgaa tcggcggccg attgatgtcg ttttcaccct    780

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gaagaagagg aagttgggga tgatgagcg aagggttgtg ccacaggggga gctccgataa    960

taaaatattt gcgttaaata ttcatattcc tggcaagaag aattatttac aagccctcaa   1020

gatgtgtcaa gatatgctgg ctaatgaaat tttgaaaaaa caggaacaag gtggcgacga   1080

ttctgctgat aagaactgtt ataatgagat aactgttctc ttgaacggca cggccgcctt   1140

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<212>  PRT
<213>  Tribolium castaneum

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Phe Leu Glu Asp His Gly Leu Lys Asp Asp Val Gly Arg Ile Met His
            20                  25                  30


Glu Asn Asn Val His Leu Val Asn Asp Asp Gly Glu Glu Glu Lys Tyr
        35                  40                  45


Ser Asn Glu Ala Asn Tyr Thr Glu Ser Ile Phe Pro Pro Asp Gln Pro
    50                  55                  60


8

```
Thr Asn Leu Gly Thr Glu Glu Tyr Pro Gly Pro Phe Asn Phe Ser Val
65                  70              75                      80


Leu Ile Ser Pro Asn Glu Gln Lys Ser Pro Trp Glu Tyr Ser Glu Lys
                85              90                  95


Leu Asn Lys Ile Phe Ile Gly Ile Asn Val Lys Phe Pro Val Ala Phe
            100             105             110


Ser Val Gln Asn Arg Pro Gln Asn Leu Pro Leu Tyr Ile Arg Ala Thr
            115             120             125


Pro Val Phe Ser Gln Thr Gln His Phe Gln Asp Leu Val His Arg Cys
    130             135             140


Val Gly His Arg His Pro Gln Asp Gln Ser Asn Lys Gly Val Ala Pro
145             150             155             160


His Ile Phe Gln His Ile Ile Arg Cys Thr Asn Asp Asn Ala Leu Tyr
            165             170             175


Phe Gly Asp Lys Asn Thr Gly Thr Arg Leu Asn Ile Val Leu Pro Leu
            180             185             190


Ala His Pro Gln Val Gly Glu Asp Val Val Lys Glu Phe Phe Gln Phe
    195             200             205


Val Cys Lys Asn Ser Cys Pro Leu Gly Met Asn Arg Arg Pro Ile Asp
    210             215             220


Val Val Phe Thr Leu Glu Asp Asn Lys Gly Glu Val Phe Gly Arg Arg
225             230             235             240


Leu Val Gly Val Arg Val Cys Ser Cys Pro Lys Arg Asp Lys Asp Lys
            245             250             255


Glu Glu Lys Asp Met Glu Ser Ala Val Pro Pro Arg Arg Lys Lys Arg
            260             265             270


Lys Leu Gly Asn Asp Glu Arg Arg Val Val Pro Gln Gly Ser Ser Asp
            275             280             285
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9

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Asn Lys Ile Phe Ala Leu Asn Ile His Ile Pro Gly Lys Lys Asn Tyr
    290                 295             300

Leu Gln Ala Leu Lys Met Cys Gln Asp Met Leu Ala Asn Glu Ile Leu
305             310             315                 320

Lys Lys Gln Glu Gln Gly Gly Asp Asp Ser Ala Asp Lys Asn Cys Tyr
                325             330             335

Asn Glu Ile Thr Val Leu Leu Asn Gly Thr Ala Ala Phe Asp
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<212> DNA
<213> Tribolium castaneum

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ttcccccccca gcgagccgct cgagctgtgc aacaccgagt accccggccc cctcaacttc     180

gaggtgtttg tggaccccaa cgtgctcaaa aacccctggg aatactcccc aattctcaac     240

aaaatttaca tcgatatgaa acacaaattc ccgattaatt tcagcgtgaa gaaggccgat     300

cctgagcgca ggctttttgt cagagttatg ccgatgtttg aggaagacag atatgtgcaa     360

gaattggtgc ataggtgcat ctgtcacgaa caattgacag atccgaccaa tcacaacgtt     420

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<212> PRT
<213> Tribolium castaneum

<400> 8

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Ile Cys Ser Ile Phe Gln Leu Glu Asp Phe Lys Phe Asn Ile Asn Gln
            20              25              30

Ser Ser Tyr Leu Ser Ala Pro Ile Phe Pro Pro Ser Glu Pro Leu Glu
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10

Leu Cys Asn Thr Glu Tyr Pro Gly Pro Leu Asn Phe Glu Val Phe Val
    50                    55                  60

Asp Pro Asn Val Leu Lys Asn Pro Trp Glu Tyr Ser Pro Ile Leu Asn
65                70             75              80

Lys Ile Tyr Ile Asp Met Lys His Lys Phe Pro Ile Asn Phe Ser Val
          85                90             95

Lys Lys Ala Asp Pro Glu Arg Arg Leu Phe Val Arg Val Met Pro Met
        100             105         110

Phe Glu Glu Asp Arg Tyr Val Gln Glu Leu Val His Arg Cys Ile Cys
       115            120         125

His Glu Gln Leu Thr Asp Pro Thr Asn His Asn Val Ser Glu Met Val
   130            135          140

Ala Gln His Ile Ile Arg Cys Asp Asn Asn Asn Ala Gln Tyr Phe Gly
145             150          155         160

Asp Lys Asn Ala Gly Lys Arg Leu Ser
          165

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<212> DNA
<213> Heliothis virescens

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aaacgtgctc cactcgtccc gggagatcgg tacccagggc gtgtactact gcgggaaggt   240

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ctgctcccat gcgtaccagt tctcctgcaa gaactcttgt gcaaccggca ttaataggcg   360

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<212> PRT
<213> Heliothis virescens

<400> 10

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1               5                   10                  15


Lys Ala Pro His Met Phe Val Arg Ser Thr Val Val Phe Ser Asp Glu
            20                  25                  30


Thr Gln Ala Glu Lys Arg Val Glu Arg Cys Val Gln His Phe His Glu
        35                  40                  45


Ser Ser Thr Ser Gly Ile Gln Thr Glu Ile Ala Lys Asn Val Leu His
    50                  55                  60


Ser Ser Arg Glu Ile Gly Thr Gln Gly Val Tyr Tyr Cys Gly Lys Val
65                  70                  75                  80


Asp Met Ala Asp Ser Trp Tyr Ser Val Leu Val Glu Phe Met Arg Thr
                85                  90                  95


Ser Ser Glu Ser Cys Ser His Ala Tyr Gln Phe Ser Cys Lys Asn Ser
            100                 105                 110


Cys Ala Thr Gly Ile Asn Arg Arg Ala Ile Ala Ile Ile Phe Thr Leu
        115                 120                 125


Glu Asp Ala Met Gly Asn Ile His Gly Arg Gln Lys Val Gly Ala Arg
    130                 135                 140


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<212> DNA
<213> Drosophila melanogaster

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12

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<210>  18
<211>  27425
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13

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aacgaaagtc cgggaggggg cggggcggta ttcatgctgc agttgcccat aaattcaacg    420

aaattgctac agtttttatt tgtaatgact gggcatggta agttaatatg attcttcata    480

ctgattaagt gcttttgtta cttttttaat tattcaagta aaaatattaa tttgtgtttc    540

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atatacgagt aaatgggcaa tatgaaaatt tgaaaaaggt aaagcttatg atactaacta    660

atgccaaatg aaaactagga gtatgataat aatatgaaga tagcccacca ggctatccca    720

aaatcgtcat caaatccaat ggtgttcatt aaattaggta atcgcatgtg cccttatgtc    780

aaccatatcg ccgctcaacc aagtcatttc ggtcgctgag gcaatcgaga tatggggcgc    840

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14

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17

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21

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22

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27

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28

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ttaattgtaa ttgcagctaa ctggcttttg ggtacttttg cttttaacgc caaatgtgaa  27240

atattaagta tattttattt aagcgatggc acctgtaaat tgagatttaa gggggtatat  27300

taaatgggtg aacttgatga ttttttttttt tcatcaaacg tttattaaag tctattgctt  27360

aaaaaaatga aagtaaattg cttgccattt taggaggata tttttgaaaa atcgttacaa  27420
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29

ctttt                                                                    27425

<210>  19
<211>  1781
<212>  DNA
<213>  Drosophila melanogaster

<400>  19
gaattcggca cgagacgcca tacaaaaagt tggaactgag tggaatcgga gtactatata      60

gccagccgat cccttccaga gcgccggaag agtagctcac atccgaaccc acgtccccga     120

gccgatgtcg cggcgggaat agagcgattc gcagtccaaa cacgatgata aaccccattg     180

catccgagtc ggaggccatc aattcggcca cctatgtgga caactatatc gattcggtgg     240

aaaatctgcc ggacgacgtg cagcgccagt tgtcacgcat ccgcgacata gacgtccagt     300

acagaggcct cattcgcgac gtagaccact actacgacct gtatctgtcc ctgcagaact     360

ccgcggatgc cgggcgacgg tctcgaagca tctccaggat gcaccagagt ctcattcagg     420

cgcaggaact gggcgacgaa aaaatgcaga tcgtcaatca tatgcaggag ataatcgacg     480

gcaagctgcg ccagctggac accgaccagc agaacctgga cctgaaggag accgcgatc     540

ggtatgcgct cctggacgat ggcacgcctt cgaagctgca acgcctgcag agcccgatga     600

gggagcaggg caaccaagcg ggcactggca acggtggcct aaatggaaac ggcctgcttt     660

cggccaaaga tctgtacgcc ttgggcggct atgcaggtgg tgttgtgcct ggttctaatg     720

ccatgacctc cggcaacggt ggcggctcaa cgcccaactc ggagcgctcg agccatgtca     780

gtaatggtgg caacagcggc tccaatggca atgccagcgg cggaggaggc ggagaactgc     840

agcgcacagg tagcaagcgg tcgaggaggc gaaacgagag tgttgttaac aacggaagct     900

ctctggagat gggcggcaac gagtccaact cggcaaatga gccagtggc agtggtggtg     960

gcagtggcga gcgcaaatcc tcgttgggcg gtgccagtgg agcgggacag ggacgaaagg    1020

ccagtctgca gtcggcttct ggcagtttgg ctagcggctc tgcagccacg agcagtggag    1080

cagccggagg tggtggtgcc aacggagccg gcgtagttgg tggcaataat tccggcaaga    1140

agaaaaagcg caaggtacgc ggttctgggg cttcaaatgc caatgccagt acgcgagagg    1200

agacgccgcc gccggagacc attgatccgg acgagccgac ctactgtgtc tgcaatcaga    1260

tctcctttgg cgagatgatc ctgtgcgaca atgacctgtg ccccatcgag tggttccatt    1320

tttcgtgcgt ctccctggta ctaaaaccaa aaggcaagtg gttctgcccc aactgccgcg    1380

gagaacggcc aaatgtaatg aaacccaagg cgcagttcct caaagaactg gagcgctaca    1440

30

```
acaaggaaaa ggaggagaag acctagtcta ttaggccagc ctatccaacc cattgctctg   1500

tgtctaacac caggctctgt aaaatattcg atcctaagat ttaccttaat gtatatttag   1560

tgactttctt agacccgatc ccttttcgac tttcccctct ttcacccagt ttagatccct   1620

cgcttctatg gttataggtc gtcagttttc atttaaagtt tctgtacaaa caatatcttt   1680

ctcaatgtaa acacacaaaa actcgtataa ttagagtaca cctaaactta atttatggta   1740

ataaacgttg atattcaaaa aaaaaaaaaa aaaaaactcg a                      1781
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<210> 20
<211> 433
<212> PRT
<213> Drosophila melanogaster

<400> 20

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Met Ile Asn Pro Ile Ala Ser Glu Ser Glu Ala Ile Asn Ser Ala Thr
1               5                   10                  15


Tyr Val Asp Asn Tyr Ile Asp Ser Val Glu Asn Leu Pro Asp Asp Val
            20                  25                  30


Gln Arg Gln Leu Ser Arg Ile Arg Asp Ile Asp Val Gln Tyr Arg Gly
        35                  40                  45


Leu Ile Arg Asp Val Asp His Tyr Tyr Asp Leu Tyr Leu Ser Leu Gln
    50                  55                  60


Asn Ser Ala Asp Ala Gly Arg Arg Ser Arg Ser Ile Ser Arg Met His
65                  70                  75                  80


Gln Ser Leu Ile Gln Ala Gln Glu Leu Gly Asp Glu Lys Met Gln Ile
                85                  90                  95


Val Asn His Met Gln Glu Ile Ile Asp Gly Lys Leu Arg Gln Leu Asp
                100                 105                 110


Thr Asp Gln Gln Asn Leu Asp Leu Lys Glu Asp Arg Asp Arg Tyr Ala
            115                 120                 125


Leu Leu Asp Asp Gly Thr Pro Ser Lys Leu Gln Arg Leu Gln Ser Pro
    130                 135                 140
```

31

```
Met Arg Glu Gln Gly Asn Gln Ala Gly Thr Gly Asn Gly Gly Leu Asn
145                 150                 155                 160


Gly Asn Gly Leu Leu Ser Ala Lys Asp Leu Tyr Ala Leu Gly Gly Tyr
                165                 170                 175


Ala Gly Gly Val Val Pro Gly Ser Asn Ala Met Thr Ser Gly Asn Gly
            180                 185                 190


Gly Gly Ser Thr Pro Asn Ser Glu Arg Ser Ser His Val Ser Asn Gly
        195                 200                 205


Gly Asn Ser Gly Ser Asn Gly Asn Ala Ser Gly Gly Gly Gly Gly Glu
    210                 215                 220


Leu Gln Arg Thr Gly Ser Lys Arg Ser Arg Arg Arg Asn Glu Ser Val
225                 230                 235                 240


Val Asn Asn Gly Ser Ser Leu Glu Met Gly Gly Asn Glu Ser Asn Ser
                245                 250                 255


Ala Asn Glu Ala Ser Gly Ser Gly Gly Gly Ser Gly Glu Arg Lys Ser
        260                 265                 270


Ser Leu Gly Gly Ala Ser Gly Ala Gly Gln Gly Arg Lys Ala Ser Leu
        275                 280                 285


Gln Ser Ala Ser Gly Ser Leu Ala Ser Gly Ser Ala Ala Thr Ser Ser
    290                 295                 300


Gly Ala Ala Gly Gly Gly Gly Ala Asn Gly Ala Gly Val Val Gly Gly
305                 310                 315                 320


Asn Asn Ser Gly Lys Lys Lys Lys Arg Lys Val Arg Gly Ser Gly Ala
                325                 330                 335


Ser Asn Ala Asn Ala Ser Thr Arg Glu Glu Thr Pro Pro Pro Glu Thr
            340                 345                 350


Ile Asp Pro Asp Glu Pro Thr Tyr Cys Val Cys Asn Gln Ile Ser Phe
        355                 360                 365


Gly Glu Met Ile Leu Cys Asp Asn Asp Leu Cys Pro Ile Glu Trp Phe
```

32

His Phe Ser Cys Val Ser Leu Val Leu Lys Pro Lys Gly Lys Trp Phe
385             390                 395                 400

Cys Pro Asn Cys Arg Gly Glu Arg Pro Asn Val Met Lys Pro Lys Ala
                405                 410                 415

Gln Phe Leu Lys Glu Leu Glu Arg Tyr Asn Lys Glu Lys Glu Glu Lys
            420                 425                 430

Thr


<210> 21
<211> 2666
<212> DNA
<213> Drosophila melanogaster

<400> 21
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actagtagac tatagaatat aaacagtttc ctaccaatgg agacttgtga agtggaggga     120

gaggcggaga cgctggtgag acgcttctcc gtcagctgcg agcaattgga gctggaagcg     180

agaattcagc aaagcgctct gtccacctac catcgcttgg atgcggtcaa cgggctgtcc     240

accagcgagg cagatgccca ggagtggctg tgttgcgccg tctacagcga actgcagcgc     300

tcgaagatgc gcgatattag ggagtccatc aacgaggcaa acgattcggt ggccaagaac     360

tgctgctgga acgtgtcact aacccgtctg ctgcgcagct ttaagatgaa cgtgtcccag     420

tttctacgcc gcatggagca ctggaattgg ctgacccaaa acgagaacac tttccagctg     480

gaggttgagg aactgcgttg tcgacttggt attacttcga cgctgctgcg gcattataag     540

cacatctttc ggagcctgtt cgttcacccg gcaagggtgc ggacccgggt gccgcgaatc     600

actaccaagc gctgtatgag ttcggttggt tgctcttcct ggtcattcgc aacgagttac     660

ccggttttgc gattacaaac ctgatcaacg gctgtcaggt gctcgtttgc acaatggatc     720

tcctttttcgt gaacgcctta gaggtgcccc gatccgtagt tatccgccgg gagttctctg     780

gagtgcccaa gaattgggac accgaagact tcaatcctat tttgctaaat aaatatagcg     840

tgctagaagc actgggagaa ctgattcccg agctaccagc gaagggagtg gtgcaaatga     900

agaacgcctt tttccacaaa gccttaataa tgctctatat ggaccatagt ctagttggag     960

33

```
acgacaccca tatgcgggag atcattaagg agggtatgct agatatcaat ctggaaaact    1020

taaatcgcaa atacaccaat caagtagccg acattagtga gatggacgag cgtgtgctgc    1080

tcagcgtcca gggggcgata gagaccaaag gggactctcc taaaagccca cagctcgcct    1140

tccaaacaag ctcgtcacct tcgcatagga agctgtccac ccatgatcta ccagcaagtc    1200

ttcccctaag cattataaaa gcattcccca agaaggaaga cgcagataaa attgtaaatt    1260

atttagatca aactctggaa gaaatgaatc ggacctttac catggccgtg aaagattttt    1320

tggatgctaa gttgtctgga aaacgattcc gccaggccag aggcctttac tacaaatatt    1380

tgcagaaaat tttgggaccg gagctggttc aaaaaccaca gctgaagatt ggtcagttaa    1440

tgaagcagcg caagcttacc gccgccctgt tagcttgctg cctggaactg gcacttcacg    1500

tccaccacaa actagtggaa ggcctaaggt ttccctttgt cctgcactgc ttttcactgg    1560

acgcctacga ctttcaaaag attctagagt tggtggtgcg ctacgatcat ggttttctgg    1620

gcagagagct gatcaagcac ctggatgtgg tggaggaaat gtgcctggag tcgttgattt    1680

tccgcaagag ctcacagctg tggtgggagc taaatcaaag acttccccgc tacaaggaag    1740

tcgatgcaga aacagaagac aaggagaact tttcaacagg ctcaagcatc tgccttcgaa    1800

agttctacgg actggccaac cggcggctgc tccttctgtg taagagtctt tgcctcgtgg    1860

attcctttcc ccaaatatgg cacctggccg agcactcttt caccttagag agtagccgtc    1920

tgctccgcaa tcgacacctg gaccaactgc tgttgtgcgc catacatctt catgttcggc    1980

tcgagaagct tcacctcact ttcagcatga ttatccagca ctatcgccga cagccgcact    2040

ttcggagaag cgcttaccga gaggttagct tgggcaatgg tcagaccgct gatattatca    2100

ctttctacaa cagtgtgtat gtccaaagta tgggcaacta tggccgccac ctggagtgtg    2160

cgcaaacacg caagtcactg gaagaatcac agagtagcgt tggtattctg acggaaaaca    2220

acttccaacg aattgagcat gagagccaac atcagcatat cttcaccgcc ccctcccagg    2280

gtatgccaaa gtggctcctg ctccagtcat ccaccttcat ctcccgccgc atcaccactt    2340

tccttgcaaa gctcgcccaa cgtaaagcgt gctgcttcga gtaacgactt gatgagagag    2400

atcaagcgac caaacatcct gcggcgtcgc cagctttcag tgatctaata accaatcaaa    2460

aaaggcttaa atacttggct gcattttacg cagctagctt agtatatttc ttaaactcaa    2520

aaatggtaat taaataatgt ttaaattata gatattttat taacttgttc aagtaagtta    2580

aaagcttttg cttttgtaaa aataaaggaa taactgccac tcgtagttta aataaatttt    2640

taaaaaaaaa aaaaaaaaaa ctcgag                                          2666
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34

<210> 22
<211> 556
<212> PRT
<213> Drosophila melanogaster

<400> 22

Met Asp Leu Leu Phe Val Asn Ala Leu Glu Val Pro Arg Ser Val Val
1               5                   10                  15

Ile Arg Arg Glu Phe Ser Gly Val Pro Lys Asn Trp Asp Thr Glu Asp
            20                  25                  30

Phe Asn Pro Ile Leu Leu Asn Lys Tyr Ser Val Leu Glu Ala Leu Gly
        35                  40                  45

Glu Leu Ile Pro Glu Leu Pro Ala Lys Gly Val Val Gln Met Lys Asn
    50                  55                  60

Ala Phe Phe His Lys Ala Leu Ile Met Leu Tyr Met Asp His Ser Leu
65                  70                  75                  80

Val Gly Asp Asp Thr His Met Arg Glu Ile Ile Lys Glu Gly Met Leu
                85                  90                  95

Asp Ile Asn Leu Glu Asn Leu Asn Arg Lys Tyr Thr Asn Gln Val Ala
        100                 105                 110

Asp Ile Ser Glu Met Asp Glu Arg Val Leu Leu Ser Val Gln Gly Ala
        115                 120                 125

Ile Glu Thr Lys Gly Asp Ser Pro Lys Ser Pro Gln Leu Ala Phe Gln
    130                 135                 140

Thr Ser Ser Ser Pro Ser His Arg Lys Leu Ser Thr His Asp Leu Pro
145                 150                 155                 160

Ala Ser Leu Pro Leu Ser Ile Ile Lys Ala Phe Pro Lys Lys Glu Asp
                165                 170                 175

Ala Asp Lys Ile Val Asn Tyr Leu Asp Gln Thr Leu Glu Glu Met Asn
        180                 185                 190

35

```
Arg Thr Phe Thr Met Ala Val Lys Asp Phe Leu Asp Ala Lys Leu Ser
        195                 200                 205

Gly Lys Arg Phe Arg Gln Ala Arg Gly Leu Tyr Tyr Lys Tyr Leu Gln
        210                 215                 220

Lys Ile Leu Gly Pro Glu Leu Val Gln Lys Pro Gln Leu Lys Ile Gly
225                 230                 235                 240

Gln Leu Met Lys Gln Arg Lys Leu Thr Ala Ala Leu Leu Ala Cys Cys
                245                 250                 255

Leu Glu Leu Ala Leu His Val His His Lys Leu Val Glu Gly Leu Arg
                260                 265                 270

Phe Pro Phe Val Leu His Cys Phe Ser Leu Asp Ala Tyr Asp Phe Gln
        275                 280                 285

Lys Ile Leu Glu Leu Val Val Arg Tyr Asp His Gly Phe Leu Gly Arg
        290                 295                 300

Glu Leu Ile Lys His Leu Asp Val Val Glu Glu Met Cys Leu Glu Ser
305                 310                 315                 320

Leu Ile Phe Arg Lys Ser Ser Gln Leu Trp Trp Glu Leu Asn Gln Arg
                325                 330                 335

Leu Pro Arg Tyr Lys Glu Val Asp Ala Glu Thr Glu Asp Lys Glu Asn
                340                 345                 350

Phe Ser Thr Gly Ser Ser Ile Cys Leu Arg Lys Phe Tyr Gly Leu Ala
        355                 360                 365

Asn Arg Arg Leu Leu Leu Leu Cys Lys Ser Leu Cys Leu Val Asp Ser
        370                 375                 380

Phe Pro Gln Ile Trp His Leu Ala Glu His Ser Phe Thr Leu Glu Ser
385                 390                 395                 400

Ser Arg Leu Leu Arg Asn Arg His Leu Asp Gln Leu Leu Leu Cys Ala
                405                 410                 415

Ile His Leu His Val Arg Leu Glu Lys Leu His Leu Thr Phe Ser Met
```

36

Ile Ile Gln His Tyr Arg Arg Gln Pro His Phe Arg Arg Ser Ala Tyr
        435                440                445

Arg Glu Val Ser Leu Gly Asn Gly Gln Thr Ala Asp Ile Ile Thr Phe
    450                455                460

Tyr Asn Ser Val Tyr Val Gln Ser Met Gly Asn Tyr Gly Arg His Leu
465                470                475                480

Glu Cys Ala Gln Thr Arg Lys Ser Leu Glu Glu Ser Gln Ser Ser Val
            485                490                495

Gly Ile Leu Thr Glu Asn Asn Phe Gln Arg Ile Glu His Glu Ser Gln
        500                505                510

His Gln His Ile Phe Thr Ala Pro Ser Gln Gly Met Pro Lys Trp Leu
        515                520                525

Leu Leu Gln Ser Ser Thr Phe Ile Ser Arg Arg Ile Thr Thr Phe Leu
    530                535                540

Ala Lys Leu Ala Gln Arg Lys Ala Cys Cys Phe Glu
545                550                555


<210>  23
<211>  9
<212>  PRT
<213>  Any Insect

<400>  23

Arg Ile Cys Ser Cys Pro Lys Arg Asp
1                5


<210>  24
<211>  9
<212>  PRT
<213>  Any Insect

<400>  24

Lys Ile Cys Ser Cys Pro Lys Arg Asp
1                5

```
<210>   25
<211>   9
<212>   PRT
<213>   Any Insect

<400>   25

Arg Val Cys Ser Cys Pro Lys Arg Asp
1                   5


<210>   26
<211>   9
<212>   PRT
<213>   Any Insect

<400>   26

Lys Val Cys Ser Cys Pro Lys Arg Asp
1                   5


<210>   27
<211>   9
<212>   PRT
<213>   Any Insect

<400>   27

Arg Ile Cys Thr Cys Pro Lys Arg Asp
1                   5


<210>   28
<211>   9
<212>   PRT
<213>   Any Insect

<400>   28

Lys Ile Cys Thr Cys Pro Lys Arg Asp
1                   5


<210>   29
<211>   9
<212>   PRT
<213>   Any Insect

<400>   29

Arg Val Cys Thr Cys Pro Lys Arg Asp
1                   5


<210>   30
<211>   9
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<212>   PRT
<213>   Any Insect

<400>   30

Lys Val Cys Thr Cys Pro Lys Arg Asp
1               5


<210>   31
<211>   7
<212>   PRT
<213>   Any Insect


<220>
<221>   misc_feature
<222>   (2)..(2)
<223>   "X" is any amino acid

<400>   31

Phe Xaa Cys Lys Asn Ser Cys
1               5


<210>   32
<211>   7
<212>   PRT
<213>   Any Insect


<220>
<221>   misc_feature
<222>   (2)..(2)
<223>   "X" is any amino acid

<400>   32

Phe Xaa Cys Gln Asn Ser Cys
1               5


<210>   33
<211>   393
<212>   PRT
<213>   Homo sapiens

<400>   33

Met Glu Glu Pro Gln Ser Asp Pro Ser Val Glu Pro Pro Leu Ser Gln
1               5                   10                  15


Glu Thr Phe Ser Asp Leu Trp Lys Leu Leu Pro Glu Asn Asn Val Leu
            20                  25                  30
```

```
Ser Pro Leu Pro Ser Gln Ala Met Asp Asp Leu Met Leu Ser Pro Asp
        35                  40                  45

Asp Ile Glu Gln Trp Phe Thr Glu Asp Pro Gly Pro Asp Glu Ala Pro
        50                  55                  60

Arg Met Pro Glu Ala Ala Pro Arg Val Ala Pro Ala Pro Ala Ala Pro
65                  70                  75                  80

Thr Pro Ala Ala Pro Ala Pro Ala Pro Ser Trp Pro Leu Ser Ser Ser
                85                  90                  95

Val Pro Ser Gln Lys Thr Tyr Gln Gly Ser Tyr Gly Phe Arg Leu Gly
                100                 105                 110

Phe Leu His Ser Gly Thr Ala Lys Ser Val Thr Cys Thr Tyr Ser Pro
        115                 120                 125

Ala Leu Asn Lys Met Phe Cys Gln Leu Ala Lys Thr Cys Pro Val Gln
        130                 135                 140

Leu Trp Val Asp Ser Thr Pro Pro Pro Gly Thr Arg Val Arg Ala Met
145                 150                 155                 160

Ala Ile Tyr Lys Gln Ser Gln His Met Thr Glu Val Val Arg Arg Cys
                165                 170                 175

Pro His His Glu Arg Cys Ser Asp Ser Asp Gly Leu Ala Pro Pro Gln
                180                 185                 190

His Leu Ile Arg Val Glu Gly Asn Leu Arg Val Glu Tyr Leu Asp Asp
        195                 200                 205

Arg Asn Thr Phe Arg His Ser Val Val Val Pro Tyr Glu Pro Pro Glu
        210                 215                 220

Val Gly Ser Asp Cys Thr Thr Ile His Tyr Asn Tyr Met Cys Asn Ser
225                 230                 235                 240

Ser Cys Met Gly Gly Met Asn Arg Arg Pro Ile Leu Thr Ile Ile Thr
                245                 250                 255
```

40

```
Leu Glu Asp Ser Ser Gly Asn Leu Leu Gly Arg Asn Ser Phe Glu Val
            260             265             270

Arg Val Cys Ala Cys Pro Gly Arg Asp Arg Arg Thr Glu Glu Glu Asn
            275             280             285

Leu Arg Lys Lys Gly Glu Pro His His Glu Leu Pro Pro Gly Ser Thr
    290             295             300

Lys Arg Ala Leu Pro Asn Asn Thr Ser Ser Ser Pro Gln Pro Lys Lys
305             310             315             320

Lys Pro Leu Asp Gly Glu Tyr Phe Thr Leu Gln Ile Arg Gly Arg Glu
                325             330             335

Arg Phe Glu Met Phe Arg Glu Leu Asn Glu Ala Leu Glu Leu Lys Asp
            340             345             350

Ala Gln Ala Gly Lys Glu Pro Gly Gly Ser Arg Ala His Ser Ser His
    355             360             365

Leu Lys Ser Lys Lys Gly Gln Ser Thr Ser Arg His Lys Lys Leu Met
    370             375             380

Phe Lys Thr Glu Gly Pro Asp Ser Asp
385             390


<210>   34
<211>   363
<212>   PRT
<213>   Xenopus laevis

<400>   34

Met Glu Pro Ser Ser Glu Thr Gly Met Asp Pro Pro Leu Ser Gln Glu
1               5               10              15

Thr Phe Glu Asp Leu Trp Ser Leu Leu Pro Asp Pro Leu Gln Thr Val
            20              25              30

Thr Cys Arg Leu Asp Asn Leu Ser Glu Phe Pro Asp Tyr Pro Leu Ala
            35              40              45

Ala Asp Met Thr Val Leu Gln Glu Gly Leu Met Gly Asn Ala Val Pro
    50              55              60
```

41

```
Thr Val Thr Ser Cys Ala Val Pro Ser Thr Asp Asp Tyr Ala Gly Lys
65              70              75              80


Tyr Gly Leu Gln Leu Asp Phe Gln Gln Asn Gly Thr Ala Lys Ser Val
            85              90              95


Thr Cys Thr Tyr Ser Pro Glu Leu Asn Lys Leu Phe Cys Gln Leu Ala
        100             105             110


Lys Thr Cys Pro Leu Leu Val Arg Val Glu Ser Pro Pro Pro Arg Gly
        115             120             125


Ser Ile Leu Arg Ala Thr Ala Val Tyr Lys Lys Ser Glu His Val Ala
    130             135             140


Glu Val Val Lys Arg Cys Pro His His Glu Arg Ser Val Glu Pro Gly
145             150             155             160


Glu Asp Ala Ala Pro Pro Ser His Leu Met Arg Val Glu Gly Asn Leu
            165             170             175


Gln Ala Tyr Tyr Met Glu Asp Val Asn Ser Gly Arg His Ser Val Cys
        180             185             190


Val Pro Tyr Glu Gly Pro Gln Val Gly Thr Glu Cys Thr Thr Val Leu
    195             200             205


Tyr Asn Tyr Met Cys Asn Ser Ser Cys Met Gly Gly Met Asn Arg Arg
    210             215             220


Pro Ile Leu Thr Ile Ile Thr Leu Glu Thr Pro Gln Gly Leu Leu Leu
225             230             235             240


Gly Arg Arg Cys Phe Glu Val Arg Val Cys Ala Cys Pro Gly Arg Asp
            245             250             255


Arg Arg Thr Glu Glu Asp Asn Tyr Thr Lys Lys Arg Gly Leu Lys Pro
        260             265             270


Ser Gly Lys Arg Glu Leu Ala His Pro Pro Ser Ser Glu Pro Pro Leu
    275             280             285
```

Pro Lys Lys Arg Leu Val Val Val Asp Asp Asp Glu Glu Ile Phe Thr
    290                 295                 300

Leu Arg Ile Lys Gly Arg Ser Arg Tyr Glu Met Ile Lys Lys Leu Asn
305                 310                 315                 320

Asp Ala Leu Glu Leu Gln Glu Ser Leu Asp Gln Gln Lys Val Thr Ile
                325                 330                 335

Lys Cys Arg Lys Cys Arg Asp Glu Ile Lys Pro Lys Lys Gly Lys Lys
                340                 345                 350

Leu Leu Val Lys Asp Glu Gln Pro Asp Ser Glu
        355                 360


<210>  35
<211>  564
<212>  PRT
<213>  Loligo forbesi

<400>  35

Met Ser Gln Gly Thr Ser Pro Asn Ser Gln Glu Thr Phe Asn Leu Leu
1                 5                 10                 15

Trp Asp Ser Leu Glu Gln Val Thr Ala Asn Glu Tyr Thr Gln Ile His
                20                 25                 30

Glu Arg Gly Val Gly Tyr Glu Tyr His Glu Ala Glu Pro Asp Gln Thr
                35                 40                 45

Ser Leu Glu Ile Ser Ala Tyr Arg Ile Ala Gln Pro Asp Pro Tyr Gly
        50                 55                 60

Arg Ser Glu Ser Tyr Asp Leu Leu Asn Pro Ile Ile Asn Gln Ile Pro
65                 70                 75                 80

Ala Pro Met Pro Ile Ala Asp Thr Gln Asn Asn Pro Leu Val Asn His
                85                 90                 95

Cys Pro Tyr Glu Asp Met Pro Val Ser Ser Thr Pro Tyr Ser Pro His
                100                 105                 110

Asp His Val Gln Ser Pro Gln Pro Ser Val Pro Ser Asn Ile Lys Tyr

43

```
         115                    120                    125


Pro Gly Glu Tyr Val Phe Glu Met Ser Phe Ala Gln Pro Ser Lys Glu
    130                 135                 140


Thr Lys Ser Thr Thr Trp Thr Tyr Ser Glu Lys Leu Asp Lys Leu Tyr
145                 150                 155                 160


Val Arg Met Ala Thr Thr Cys Pro Val Arg Phe Lys Thr Ala Arg Pro
                165                 170                 175


Pro Pro Ser Gly Cys Gln Ile Arg Ala Met Pro Ile Tyr Met Lys Pro
                180                 185                 190


Glu His Val Gln Glu Val Val Lys Arg Cys Pro Asn His Ala Thr Ala
        195                 200                 205


Lys Glu His Asn Glu Lys His Pro Ala Pro Leu His Ile Val Arg Cys
    210                 215                 220


Glu His Lys Leu Ala Lys Tyr His Glu Asp Lys Tyr Ser Gly Arg Gln
225                 230                 235                 240


Ser Val Leu Ile Pro His Glu Met Pro Gln Ala Gly Ser Glu Trp Val
                245                 250                 255


Val Asn Leu Tyr Gln Phe Met Cys Leu Gly Ser Cys Val Gly Gly Pro
                260                 265                 270


Asn Arg Arg Pro Ile Gln Leu Val Phe Thr Leu Glu Lys Asp Asn Gln
        275                 280                 285


Val Leu Gly Arg Arg Ala Val Glu Val Arg Ile Cys Ala Cys Pro Gly
    290                 295                 300


Arg Asp Arg Lys Ala Asp Glu Lys Ala Ser Leu Val Ser Lys Pro Pro
305                 310                 315                 320


Ser Pro Lys Lys Asn Gly Phe Pro Gln Arg Ser Leu Val Leu Thr Asn
                325                 330                 335


Asp Ile Thr Lys Ile Thr Pro Lys Lys Arg Lys Ile Asp Asp Glu Cys
                340                 345                 350


                              44
```

```
Phe Thr Leu Lys Val Arg Gly Arg Glu Asn Tyr Glu Ile Leu Cys Lys
        355                 360                 365


Leu Arg Asp Ile Met Glu Leu Ala Ala Arg Ile Pro Glu Ala Glu Arg
        370                 375                 380


Leu Leu Tyr Lys Gln Glu Arg Gln Ala Pro Ile Gly Arg Leu Thr Ser
385                 390                 395                 400


Leu Pro Ser Ser Ser Ser Asn Gly Ser Gln Asp Gly Ser Arg Ser Ser
                405                 410                 415


Thr Ala Phe Ser Thr Ser Asp Ser Ser Gln Val Asn Ser Ser Gln Asn
                420                 425                 430


Asn Thr Gln Met Val Asn Gly Gln Val Pro His Glu Glu Glu Thr Pro
        435                 440                 445


Val Thr Lys Cys Glu Pro Thr Glu Asn Thr Ile Ala Gln Trp Leu Thr
    450                 455                 460


Lys Leu Gly Leu Gln Ala Tyr Ile Asp Asn Phe Gln Gln Lys Gly Leu
465                 470                 475                 480


His Asn Met Phe Gln Leu Asp Glu Phe Thr Leu Glu Asp Leu Gln Ser
                485                 490                 495


Met Arg Ile Gly Thr Gly His Arg Asn Lys Ile Trp Lys Ser Leu Leu
            500                 505                 510


Asp Tyr Arg Arg Leu Leu Ser Ser Gly Thr Glu Ser Gln Ala Leu Gln
        515                 520                 525


His Ala Ala Ser Asn Ala Ser Thr Leu Ser Val Gly Ser Gln Asn Ser
    530                 535                 540


Tyr Cys Pro Gly Phe Tyr Glu Val Thr Arg Tyr Thr Tyr Lys His Thr
545                 550                 555                 560


Ile Ser Tyr Leu
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